ProCurve Networking by HP

Network of Choice

Key features

- Core, distribution, advanced access layer
- Layer 2 - Layer 4 and intelligent edge feature set
- Enterprise-class performance and security
- HP ProCurve ONE integrated
- Scalable 10/100/1000 and 10-GbE connectivity

Datasheet

HP ProCurve Switch 5400zl/3500yl Series

The ProCurve Switch 5400zl/3500yl series consists of the most advanced intelligent edge switches in the ProCurve Networking product line. The 5400zl series includes 6-slot and 12-slot chassis and associated zl modules and bundles, and the 3500yl series includes 24-port and 48-port stackables. The foundation for all these switches is a purpose-built, programmable ProVision ASIC that allows the most demanding networking features, such as QoS and security, to be implemented in a scalable yet granular fashion. With a variety of Gigabit interfaces, integrated PoE on all 10/100/1000Base-T ports, 10-GbE capability, and a choice of form factors, the 5400zl/3500yl switches offer excellent investment protection, flexibility, and scalability, as well as ease of deployment, operation, and maintenance.

Features and benefits

Management

NEW **Remote Intelligent Mirroring:** mirrors selected ingress/egress traffic based on ACL, port, MAC address, or VLAN to a local or remote 8200zl/6200yl/5400zl/3500yl switch anywhere on the network

• **RMON, XRMON, and sFlow v5:** provide advanced monitoring and reporting capabilities for statistics, history, alarms, and events

• **IEEE 802.1AB Link Layer Discovery Protocol (LLDP):** automated device discovery protocol for easy mapping by network management applications

• **Command authorization:** leverages RADIUS to link a custom list of CLI commands to individual network administrator's login; also provides an audit trail

• **Friendly port names:** allow assignment of descriptive names to ports

• **Dual flash images:** provides independent primary and secondary OS files for backup while upgrading

• **Multiple configuration files:** multiple configuration files can be stored to the flash image

• **Uni-Directional Link Detection (UDLD):** monitors cable between two switches and shuts down the ports on both ends if the cable is broken turning the bi-directional link into uni-directional; this prevents network problems such as loops

• **Management simplicity:** ProCurve-common networking features and CLI implementation (common across ProCurve zl and yl switches)

Connectivity

NEW **IPv6:**
- **IPv6 host:** switches are managed and deployed at the IPv6 network's edge
- **Dual stack (IPv4/IPv6):** transitions from IPv4 to IPv6, supporting connectivity for both protocols
- **MLD snooping:** forwards IPv6 multicast traffic to the appropriate interface, preventing traffic flooding
- **IPv6 ACL/QoS:** supports ACL and QoS for IPv6 network traffic
- **IPv6 ready:** switch hardware can support IPv6 routing, tunneling, and security--available when enabled via software updates in follow-on releases

• **IEEE 802.3af Power over Ethernet:** provides up to 15.4 W per port to IEEE 802.3af compliant PoE powered devices such as IP phones, wireless access points, and security cameras

• **Pre-standard PoE support:** detects and provides power to pre-standard PoE devices; see list of supported devices in the product FAQ at www.procurve.com

• **Jumbo frames:** on Gigabit and 10-Gigabit ports, allow high-performance remote backup and disaster-recovery services

• **Auto-MDIX:** automatically adjusts for straight-through or crossover cables on all 10/100/1000 ports

Performance

• **5400zl/3500yl architecture:** 115 to 692 Gbps crossbar switching fabric provides intra- and inter-module switching with 36 to 428 million pps throughput on the purpose-built ProVision ASICs

• **Selectable queue configurations:** increase performance by selecting the number of queues and associated memory buffering that best meet the requirements of your network applications

Resiliency and high availability

• **Virtual Router Redundancy Protocol (requires Premium License):** VRRP allows groups of two routers to dynamically back each other up to create highly available routed environments

• **IEEE 802.1s Multiple Spanning Tree Protocol:** provides high link availability in multiple VLAN environments by allowing multiple spanning trees; encompasses IEEE 802.1D Spanning Tree Protocol and IEEE 802.1w Rapid Spanning Tree Protocol

• **IEEE 802.3ad Link Aggregation Control Protocol (LACP) and ProCurve trunking:** support up to 60 trunks, each with up to 8 links (ports) per trunk; trunking across modules is supported

• **Hot-swappable modules (5400zl series):** permits modules, mini-GBICs, and power supplies in a redundant power supply configuration to be added or swapped without interrupting the network

• **Optional redundant power supply (5400zl series):** provides uninterrupted power and allows hot-swapping of the redundant power supplies when installed

• **Sparing simplicity:** ProCurve zl-common accessories (interface modules, power supplies)

Layer 2 switching

NEW **IEEE 802.1ad Q-in-Q (requires Premium License):** increases the scalability of Ethernet network by providing a hierarchical structure; connects multiple LANs on high-speed campus or metro network

• **ProCurve switch meshing:** dynamically load-balances across multiple active redundant links to increase available aggregate bandwidth

• **VLAN support and tagging:** supports the IEEE 802.1Q standard and 2,048 VLANs simultaneously

• **IEEE 802.1v protocol VLANs:** isolate select non-IPv4 protocols automatically into their own VLANs

• **GARP VLAN Registration Protocol:** allows automatic learning and dynamic assignment of VLANs

Layer 3 services

• **UDP helper function:** UDP broadcasts can be directed across router interfaces to specific IP unicast or subnet broadcast addresses and prevent server spoofing for UDP services such as DHCP

• **Loopback interface address:** defines an address in RIP and OSPF that can always be reachable, improving diagnostic capability

Layer 3 routing

• **Static IP routing:** provides manually configured routing; includes ECMP capability

• **RIP:** provides RIPv1 and RIPv2 routing

• **OSPF (requires Premium License):** includes host-based ECMP to provide link redundancy/scalable bandwidth and NSSA

Security

NEW **USB Secure Autorun (requires HP ProCurve Manager Plus):** deploys, diagnoses, and updates switch using USB flash drive; works with secure credential to prevent tampering

• **Switch CPU protection:** provides automatic protection against malicious network traffic trying to shut down the switch

• **Virus throttling:** detects traffic patterns typical of WORM-type viruses and either throttles or entirely prevents the ability of the virus to spread across the routed VLANs or bridged interfaces, without requiring external appliances

• **ICMP throttling:** defeats ICMP denial-of-service attacks by enabling any switch port to automatically throttle ICMP traffic

• **Multiple user authentication methods:**
- **IEEE 802.1X:** industry-standard way of user authentication using an IEEE 802.1X supplicant on the client in conjunction with a RADIUS server
- **Web-based authentication:** authenticates from Web browser for clients that do not support 802.1X supplicant; customized remediation can be processed on an external Web server
- **MAC-based authentication:** client is authenticated with the RADIUS server based on client's MAC address

• **Authentication flexibility:**
- **Multiple IEEE 802.1X users per port:** provides authentication of multiple IEEE 802.1X users per port; prevents user "piggybacking" on another user's IEEE 802.1X authentication
- **Concurrent IEEE 802.1X, Web, and MAC authentication schemes per port:** switch port will accept up to 32 sessions of IEEE 802.1X, Web, and MAC authentications

• **Access control lists (ACLs):** provide filtering based on the IP field, source/destination IP address/subnet, and source/destination TCP/UDP port number on a per-VLAN or per-port basis

• **Identity-driven ACL:** enables implementation of a highly granular and flexible access security policy and VLAN assignment specific to each authenticated network user

• **DHCP protection:** blocks DHCP packets from unauthorized DHCP servers, preventing denial-of-service attacks

• **STP BPDU port protection:** blocks Bridge Protocol Data Units (BPDUs) on ports that do not require BPDUs, preventing forged BPDU attacks

• **Dynamic IP lockdown:** works with DHCP protection to block traffic from unauthorized hosts, preventing IP source address spoofing

• **Dynamic ARP protection:** blocks ARP broadcasts from unauthorized hosts, preventing eavesdropping or theft of network data

NEW **STP Root Guard:** protects root bridge from malicious attack or configuration mistakes

• **Detection of malicious attacks:** monitors ten types of network traffic and sends a warning when an anomaly that potentially can be caused by malicious attacks is detected

• **Port security:** allows access only to specified MAC addresses, which can be learned or specified by the administrator

• **MAC address lockout:** prevents configured particular MAC addresses from connecting to the network

• **Source-port filtering:** allows only specified ports to communicate with each other

• **RADIUS/TACACS+:** eases switch management security administration by using a password authentication server

• **Secure Shell (SSHv2):** encrypts all transmitted data for secure, remote command-line interface (CLI) access over IP networks

• **Secure Sockets Layer (SSL):** encrypts all HTTP traffic, allowing secure access to the browser-based management GUI in the switch

• **Secure FTP:** allows secure file transfer to/from the switch; protects against unwanted file downloads or unauthorized copying of switch configuration file

• **Secure management access:** all access methods--CLI, GUI, or MIB--are securely encrypted through SSHv2, SSL, and/or SNMPv3

• **Switch management logon security:** can require either RADIUS or TACACS+ authentication for secure switch CLI logon

• **Security banner:** displays a customized security policy when users log in to the switch

Convergence

• **IP multicast routing (Premium License):** includes PIM Sparse and Dense modes to route IP multicast traffic

• **IP multicast snooping (data-driven IGMP):** automatically prevents flooding of IP multicast traffic

• **LLDP-MED (Media Endpoint Discovery):** a standard extension of LLDP that stores values for parameters such as QoS and VLAN to automatically configure network devices such as IP phones

NEW **RADIUS VLAN for voice:** uses standard RADIUS attribute and LLDP-MED to automatically configure VLAN for IP phones

NEW **PoE allocations:** supports multiple methods (automatic, IEEE 802.3af class, LLDP-MED, or user specified) to allocate PoE power for more efficient energy savings

Quality of Service (QoS)

• **Layer 4 prioritization:** enables prioritization based on TCP/UDP port numbers

• **Traffic prioritization:** allows real-time traffic classification into 8 priority levels mapped to 8 queues

• **Bandwidth shaping:**
- **Port-based rate limiting:** per-port ingress/egress enforced maximum bandwidth
- **Classifier-based rate limiting:** use ACL to enforce maximum bandwidth for ingress traffic on each port
- **Guaranteed minimum:** per-port, per-queue egress-based guaranteed minimum bandwidth

• **Class of Service (CoS):** sets the IEEE 802.1p priority tag based on IP address, IP Type of Service (ToS), L3 protocol, TCP/UDP port number, source port, and DiffServ

HP ProCurve Switch 5400zl/3500yl Series

Specifications

HP ProCurve Switch 3500yl-24G-PWR Intelligent Edge (J8692A)

HP ProCurve Switch 3500yl-48G-PWR Intelligent Edge (J8693A)

HP ProCurve Switch 5406zl Intelligent Edge (J8697A)

Ports			
	1 open module slot	1 open module slot	6 open module slots
	20 auto-sensing 10/100/1000 ports (IEEE 802.3 Type 10Base-T, IEEE 802.3u Type 100Base-TX, IEEE 802.3ab Type 1000Base-T); Media Type: Auto-MDIX; Duplex: 10Base-T/100Base-TX: half or full; 1000Base-T: full only	44 auto-sensing 10/100/1000 ports (IEEE 802.3 Type 10Base-T, IEEE 802.3u Type 100Base-TX, IEEE 802.3ab Type 1000Base-T); Media Type: Auto-MDIX; Duplex: 10Base-T/100Base-TX: half or full; 1000Base-T: full only	
	1 RS-232C DB-9 console port	1 RS-232C DB-9 console port	1 RS-232C DB-9 console port
	4 dual-personality ports; each port can be used as either an RJ-45 10/100/1000 port (IEEE 802.3 Type 10Base-T; IEEE 802.3u Type 100Base-TX; IEEE 802.3ab 1000Base-T Gigabit Ethernet) with PoE or an open mini-GBIC slot (for use with mini-GBIC transceivers)	4 dual-personality ports; each port can be used as either an RJ-45 10/100/1000 port (IEEE 802.3 Type 10Base-T; IEEE 802.3u Type 100Base-TX; IEEE 802.3ab 1000Base-T Gigabit Ethernet) with PoE or an open mini-GBIC slot (for use with mini-GBIC transceivers)	
	Supports a maximum of 4 10-GbE ports	Supports a maximum of 4 10-GbE ports	Supports a maximum of 144 auto-sensing 10/100/1000 ports or 24 10-GbE ports or 144 mini-GBICs, or a combination
Power supplies			
			2 power-supply slots
Physical characteristics			
Dimensions	15.43(d) x 17.44(w) x 1.73(h) in. (39.2 x 44.3 x 4.4 cm) (1U height)	16.93(d) x 17.44(w) x 1.73(h) in. (43.0 x 44.3 x 4.4 cm) (1U height)	17.75(d) x 17.5(w) x 6.9(h) in. (45.09 x 44.45 x 17.53 cm) (4U height)
Weight	14.11 lb. (6.4 kg)	16.09 lb. (7.3 kg)	23.55 lb. (10.68 kg)
Memory and processor			
10G Module	ARM9 @ 200 MHz; packet buffer size: 36 Mb QDR SDRAM	ARM9 @ 200 MHz; packet buffer size: 36 Mb QDR SDRAM	ARM9 @ 200 MHz; packet buffer size: 36 Mb QDR SDRAM
Management Module	Stackable memory and processor: Freescale PowerPC 8540 @ 666 MHz, 4 MB flash, 128 MB compact flash, 256 MB DDR SDRAM	Stackable memory and processor: Freescale PowerPC 8540 @ 666 MHz, 4 MB flash Mb, 128 MB compact flash, 256 MB DDR SDRAM	Freescale PowerPC 8540 @ 666 MHz, 4 MB flash, 128 MB compact flash, 256 MB DDR SDRAM
Gigabit Module			ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM
Mounting			
	Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only	Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only	Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only
Performance			
1000 Mb Latency	< 3.7 µs (FIFO 64-byte packets)	< 3.7 µs (FIFO 64-byte packets)	< 3.7 µs (FIFO 64-byte packets)
10 Gbps Latency	< 2.1 µs (FIFO 64-byte packets)	< 2.1 µs (FIFO 64-byte packets)	< 2.1 µs (FIFO 64-byte packets)
Throughput	up to 75.7 million pps	up to 111.5 million pps	up to 240.2 million pps
Routing/Switching capacity	101.8 Gbps	149.8 Gbps	322.8 Gbps
Switch fabric speed	105.6 Gbps	153.6 Gbps	345.6 Gbps
Routing table size	10000 entries	10000 entries	10000 entries
Environment			

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Operating temperature	32ºF to 131ºF (0ºC to 55ºC); 32°F to 104°F (40°C) when used with any X2 10-GbE	32ºF to 131ºF (0ºC to 55ºC); 32°F to 104°F (40°C) when used with any X2 10-GbE	32ºF to 131ºF (0ºC to 55ºC); 0°C to 40°C with J8705A, J8706A, or J8707A modules installed
Operating relative humidity	15% to 95% @ 104ºF (40ºC), non-condensing	15% to 95% @ 104ºF (40ºC), non-condensing	15% to 95% @ 131ºF (55ºC), non-condensing
Non-operating/Storage temperature	-40ºF to 158ºF (-40ºC to 70ºC)	-40ºF to 158ºF (-40ºC to 70ºC)	-40ºF to 158ºF (-40ºC to 70ºC)
Non-operating/Storage relative humidity	15% to 90% @ 149ºF (65ºC), non-condensing	15% to 95% @ 149ºF (65ºC), non-condensing	15% to 95% @ 149ºF (65ºC), non-condensing
Altitude	up to 15000 ft. (4.6 km)	up to 15000 ft. (4.6 km)	up to 10000 ft. (3 km)
Acoustic	Power: 52.7 dB, Pressure: 44.8 dB ISO 7779, ISO 9296	Power: 55.1 dB, Pressure: 45.3 dB ISO 7779, ISO 9296	Power: 57 dB, Pressure: 40.2 dB ISO 7779, ISO 9296
Electrical characteristics			
Description	The switch automatically adjusts to any voltage between 100-127 and 200-240 volts and either 50 or 60 Hz	The switch automatically adjusts to any voltage between 100-127 and 200-240 volts with either 50 or 60 Hz	Chassis ships without power supplies. Two power-supply slots available; two different power supplies available. See power-supply products for additional specifications.
Maximum heat dissipation	670 BTU/hr (706 kJ/hr), (max non-PoE); 940 BTU/hr (991 kJ/hr) (max using PoE)	810 BTU/hr (854 kJ/hr), (max non-PoE); 1,090 BTU/hr (1149 kJ/hr) (max using PoE)	2450 BTU/hr (2584 kJ/hr), (max non-PoE); 3700 BTU/hr (3903 kJ/hr) (max using PoE)
Voltage	100-127 / 200-240 VAC	100-127 / 200-240 VAC	100-127 / 200-240 VAC
Current	10.0 / 5.0 A	10.0 / 5.0 A	
Power consumption	723 W	759 W	
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Notes	Maximum power rating is the worst-case theoretical maximum power number with fully loaded PoE, 100% traffic, all ports plugged in, and all modules populated. Maximum power draw if not using any PoE power is 200 W (1.8 A @ 110 V, 0.9 A @ 220 V). Full load switch only heat spec listed above subtracts heat dissipated in external PoE powered devices. Heat dissipation does not include heat dissipated by the PoE powered devices themselves.	Maximum power rating is the worst-case theoretical maximum power number with fully loaded PoE, 100% traffic, all ports plugged in, and all modules populated. Maximum power draw if not using any PoE power is 200 W (1.8 A @ 110 V, 0.9 A @ 220 V). Heat dissipation does not include heat dissipated by the PoE powered devices themselves.	Power supplies must be ordered separately. One J8712A or J8713A can power the J8697A chassis. Heat dissipation does not include heat dissipated by the PoE powered devices themselves.
Safety			
	CSA 22.2 No. 60950; UL 60950; IEC 60950; EN 60950	CSA 22.2 No. 60950; UL 60950; IEC 60950; EN 60950	CSA 22.2 No. 60950; UL 60950; IEC 60950; EN 60950
Emissions			
	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A
Immunity			
EN	EN 55024, CISPR 24	EN 55024, CISPR 24	EN 55024, CISPR 24
ESD	IEC 61000-4-2; 4 kV CD, 8 kV AD	IEC 61000-4-2; 4 kV CD, 8 kV AD	IEC 61000-4-2; 4 kV CD, 8 kV AD
Radiated	IEC 61000-4-3; 3 V/m	IEC 61000-4-3; 3 V/m	IEC 61000-4-3; 3 V/m
EFT/Burst	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)
Surge	IEC 61000-4-5; 1 kV/2 kV AC	IEC 61000-4-5; 1 kV/2 kV AC	IEC 61000-4-5; 1 kV/2 kV AC
Conducted	IEC 61000-4-6; 3 V	IEC 61000-4-6; 3 V	IEC 61000-4-6; 3 V
Power frequency magnetic field	IEC 61000-4-8; 1 A/m, 50 or 60 Hz	IEC 61000-4-8; 1 A/m, 50 or 60 Hz	IEC 61000-4-8; 1 A/m, 50 or 60 Hz
Voltage dips and interruptions	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods
Harmonics	EN 61000-3-2, IEC 61000-3-2	EN 61000-3-2, IEC 61000-3-2	EN 61000-3-2, IEC 61000-3-2

Flicker	EN 61000-3-3, IEC 61000-3-3	EN 61000-3-3, IEC 61000-3-3	EN 61000-3-3, IEC 61000-3-3
Management			
	HP ProCurve Manager Plus; HP ProCurve Manager (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)	HP ProCurve Manager Plus; HP ProCurve Manager (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)	HP ProCurve Manager Plus; HP ProCurve Manager (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)
Notes			
	When using mini-GBICs with this product, mini-GBICs with revision "B" or later (product number ends with the letter "B" or later, e.g., J4858B, J4859C) are required.	When using mini-GBICs with this product, mini-GBICs with revision "B" or later (product number ends with the letter "B" or later, e.g., J4858B, J4859C) are required.	When using mini-GBICs with this product, mini-GBICs with revision "B" or later (product number ends with the letter "B" or later, e.g., J4858B, J4859C) are required.
Services			
	3-year, 4-hour onsite, 13x5 coverage for hardware (U2855E) 3-year, 4-hour onsite, 24x7 coverage for hardware (U2856E) 3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (U6304E) 3-year, 24x7 SW phone support, software updates (UE262E) Installation with minimum configuration, system-based pricing (U4826E) Installation with HP-provided configuration, system-based pricing (U4830E)	3-year, 4-hour onsite, 13x5 coverage for hardware (H4496E) 3-year, 4-hour onsite, 24x7 coverage for hardware (H2893E) 3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (U6319E) 3-year, 24x7 SW phone support, software updates (UE264E) Installation with minimum configuration, system-based pricing (U4826E) Installation with HP-provided configuration, system-based pricing (U4830E)	3-year, 4-hour onsite, 13x5 coverage for hardware (UE250E) 3-year, 4-hour onsite, 24x7 coverage for hardware (UE251E) 3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (UE252E) 3-year, 24x7 SW phone support, software updates (UF786E) Installation with minimum configuration, system-based pricing (U4828E) Installation with HP-provided configuration, system-based pricing (U4832E)
	Refer to the HP Web site at www.procurve.com/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.	Refer to the HP Web site at www.procurve.com/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.	Refer to the HP Web site at www.procurve.com/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.

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Standards and protocols

Device management
RFC 1591 DNS (client)
HTML and telnet management

General protocols
IEEE 802.1ad Q-in-Q (Premium License)
IEEE 802.1D MAC Bridges
IEEE 802.1p Priority
IEEE 802.1Q VLANs
IEEE 802.1s Multiple Spanning Trees
IEEE 802.1v VLAN classification by Protocol and Port
IEEE 802.1w Rapid Reconfiguration of Spanning Tree
IEEE 802.3ad Link Aggregation Control Protocol (LACP)
IEEE 802.3af Power over Ethernet
IEEE 802.3x Flow Control
RFC 768 UDP
RFC 783 TFTP Protocol (revision 2)
RFC 792 ICMP
RFC 793 TCP
UDLD (Uni-directional Link Detection)
RFC 826 ARP
RFC 854 TELNET
RFC 868 Time Protocol
RFC 951 BOOTP
RFC 1058 RIPv1
RFC 1350 TFTP Protocol (revision 2)
RFC 1519 CIDR
RFC 1542 BOOTP Extensions
RFC 2030 Simple Network Time Protocol (SNTP) v4
RFC 2131 DHCP
RFC 2453 RIPv2
RFC 2548 (MS-RAS-Vendor only)
RFC 3046 DHCP Relay Agent Information Option
RFC 3576 Ext to RADIUS (CoA only)
RFC 3768 VRRP (Premium License)
RFC 4675 RADIUS VLAN & Priority

IP multicast
RFC 2362 PIM Sparse Mode (Premium License)
RFC 3376 IGMPv3 (host joins only)
RFC 3973 PIM Dense Mode (Premium License)

IPv6
RFC 1981 IPv6 Path MTU Discovery
RFC 2460 IPv6 Specification
RFC 2710 Multicast Listener Discovery (MLD) for IPv6
RFC 2925 Remote Operations MIB (Ping only)
RFC 3019 MLDv1 MIB
RFC 3315 DHCPv6 (client only)
RFC 3513 IPv6 Addressing Architecture
RFC 3596 DNS Extension for IPv6
RFC 3810 MLDv2 (host joins only)
RFC 4022 MIB for TCP
RFC 4113 MIB for UDP
RFC 4251 SSHv6 Architecture
RFC 4252 SSHv6 Authentication
RFC 4253 SSHv6 Transport Layer
RFC 4254 SSHv6 Connection
RFC 4293 MIB for IP
RFC 4419 Key Exchange for SSH
RFC 4443 ICMPv6
RFC 4541 IGMP & MLD Snooping Switch
RFC 4861 IPv6 Neighbor Discovery
RFC 4862 IPv6 Stateless Address Auto-configuration

MIBs
RFC 1213 MIB II
RFC 1493 Bridge MIB
RFC 1724 RIPv2 MIB
RFC 1850 OSPFv2 MIB
RFC 2021 RMONv2 MIB
RFC 2096 IP Forwarding Table MIB
RFC 2613 SMON MIB
RFC 2618 RADIUS Client MIB
RFC 2620 RADIUS Accounting MIB
RFC 2665 Ethernet-Like-MIB
RFC 2668 802.3 MAU MIB
RFC 2674 802.1p and IEEE 802.1Q Bridge MIB
RFC 2737 Entity MIB (Version 2)
RFC 2787 VRRP MIB
RFC 2863 The Interfaces Group MIB
RFC 2925 Ping MIB

Network management
IEEE 802.1AB Link Layer Discovery Protocol (LLDP)
RFC 2819 Four groups of RMON: 1 (statistics), 2 (history), 3 (alarm) and 9 (events)
RFC 3176 sFlow
ANSI/TIA-1057 LLDP Media Endpoint Discovery (LLDP-MED)
SNMPv1/v2c/v3
XRMON

OSPF
RFC 2328 OSPFv2 (Premium License)
RFC 3101 OSPF NSSA

QoS/Cos
RFC 2474 DiffServ Precedence, including 8 queues/port
RFC 2597 DiffServ Assured Forwarding (AF)
RFC 2598 DiffServ Expedited Forwarding (EF)

Security
IEEE 802.1X Port Based Network Access Control
RFC 1492 TACACS+
RFC 2865 RADIUS (client only)
RFC 2866 RADIUS Accounting
Secure Sockets Layer (SSL)
SSHv1/SSHv2 Secure Shell

HP ProCurve Switch 5400zl/3500yl Series

Specifications

HP ProCurve Switch 5406zl-48G Intelligent Edge (J8699A)

HP ProCurve Switch 5412zl Intelligent Edge (J8698A)

HP ProCurve Switch 5412zl-96G Intelligent Edge (J8700A)

Included accessories			
	2 HP ProCurve Switch zl 24-Port 10/100/1000 PoE Module (J8702A) 1 HP ProCurve Switch zl 875W Power Supply (J8712A)		4 HP ProCurve Switch zl 24-Port 10/100/1000 PoE Module (J8702A) 2 HP ProCurve Switch zl 875W Power Supply (J8712A)
Ports			
	4 open module slots	12 open module slots	8 open module slots
	48 auto-sensing 10/100/1000 ports (IEEE 802.3 Type 10Base-T, IEEE 802.3u Type 100Base-TX, IEEE 802.3ab Type 1000Base-T); Media Type: Auto-MDIX; Duplex: 10Base-T/100Base-TX: half or full; 1000Base-T: full only		96 auto-sensing 10/100/1000 ports (IEEE 802.3 Type 10Base-T, IEEE 802.3u Type 100Base-TX, IEEE 802.3ab Type 1000Base-T); Media Type: Auto-MDIX; Duplex: 10Base-T/100Base-TX: half or full; 1000Base-T: full only
	1 RS-232C DB-9 console port	1 RS-232C DB-9 console port	1 RS-232C DB-9 console port
	Supports a maximum of 144 auto-sensing 10/100/1000 ports or 16 10-GbE ports or 96 mini-GBICs, or a combination	Supports a maximum of 288 auto-sensing 10/100/1000 ports or 48 10-GbE ports or 288 mini-GBICs, or a combination	Supports a maximum of 288 auto-sensing 10/100/1000 ports or 32 10-GbE ports or 192 mini-GBICs, or a combination
Power supplies			
	1 power-supply slots includes: 1 x J8712A	4 power-supply slots	2 power-supply slots includes: 2 x J8712A
Physical characteristics			
Dimensions	17.75(d) x 17.5(w) x 6.9(h) in. (45.09 x 44.45 x 17.53 cm) (4U height)	17.75(d) x 17.5(w) x 12.1(h) in. (45.09 x 44.45 x 30.73 cm) (7U height)	17.75(d) x 17.5(w) x 12.1(h) in. (45.09 x 44.45 x 30.73 cm) (7U height)
Weight	34.26 lb. (15.54 kg)	34.94 lb. (15.85 kg)	58 lb. (26.31 kg)
Memory and processor			
Gigabit Module	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM
10G Module	ARM9 @ 200 MHz; packet buffer size: 36 Mb QDR SDRAM	ARM9 @ 200 MHz; packet buffer size: 36 Mb QDR SDRAM	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM
Management Module	Freescale PowerPC 8540 @ 666 MHz, 4 MB flash, 128 MB compact flash, 256 MB DDR SDRAM	Freescale PowerPC 8540 @ 666 MHz, 4 MB flash Mb, 128 MB compact flash, 256 MB DDR SDRAM	Freescale PowerPC 8540 @ 666 MHz, 4 MB flash Mb, 128 MB compact flash, 256 MB DDR SDRAM
Mounting			
	Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only	Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only	Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only
Performance			
1000 Mb Latency	< 3.7 µs (FIFO 64-byte packets)	< 3.7 µs (FIFO 64-byte packets)	< 3.7 µs (FIFO 64-byte packets)
10 Gbps Latency	< 2.1 µs (FIFO 64-byte packets)	< 2.1 µs (FIFO 64-byte packets)	< 2.1 µs (FIFO 64-byte packets)
Throughput	up to 240.2 million pps	up to 480.3 million pps	up to 480.3 million pps
Routing/Switching capacity	322.8 Gbps	645.6 Gbps	645.6 Gbps
Switch fabric speed	345.6 Gbps	691.2 Gbps	691.2 Gbps
Routing table size	10000 entries	10000 entries	10000 entries
Environment			

HP ProCurve Switch 5400zl/3500yl Series

Operating temperature	32ºF to 131ºF (0ºC to 55ºC); 0°C to 40°C with J8705A, J8706A, or J8707A modules installed	32ºF to 131ºF (0ºC to 55ºC); 0°C to 40°C with J8705A, J8706A, or J8707A modules installed	32ºF to 131ºF (0ºC to 55ºC); 0°C to 40°C with J8705A, J8706A, or J8707A modules installed
Operating relative humidity	15% to 95% @ 131ºF (55ºC), non-condensing	15% to 95% @ 131ºF (55ºC), non-condensing	15% to 95% @ 131ºF (55ºC), non-condensing
Non-operating/Storage temperature	-40ºF to 158ºF (-40ºC to 70ºC)	-40ºF to 158ºF (-40ºC to 70ºC)	-40ºF to 158ºF (-40ºC to 70ºC)
Non-operating/Storage relative humidity	15% to 95% @ 149ºF (65ºC), non-condensing	15% to 95% @ 149ºF (65ºC), non-condensing	15% to 95% @ 149ºF (65ºC), non-condensing
Altitude	up to 10000 ft. (4.6 km)	up to 10000 ft. (4.6 km)	up to 10000 ft. (4.6 km)
Acoustic	Power: 57 dB, Pressure: 40.2 dB ISO 7779, ISO 9296	Power: 64 dB, Pressure: 57.5 dB ISO 7779, ISO 9296	Power: 64 dB, Pressure: 57.5 dB ISO 7779, ISO 9296
Electrical characteristics			
Description	One J8712A installed. One open power-supply slot available; two different power supplies available. See power-supply products for additional specifications.	Chassis ships without power supplies. Four power-supply slots available; two different power supplies available. See power-supply products for additional specifications.	Two J8712A installed. Two open power-supply slots available; two different power supplies available. See power-supply products for additional specifications.
Maximum heat dissipation	2450 BTU/hr (2584 kJ/hr), (max non-PoE); 3700 BTU/hr (3903 kJ/hr) (max using PoE)	4900 BTU/hr (5169 kJ/hr), (max non-PoE); 7400 BTU/hr (7,807 kJ/hr) (max using PoE)	4900 BTU/hr (5169 kJ/hr), (max non-PoE); 7400 BTU/hr (7807 kJ/hr) (max using PoE)
Voltage	100-127 / 200-240 VAC	100-127 / 200-240 VAC	100-127 / 200-240 VAC
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Notes	Heat dissipation does not include heat dissipated by the PoE powered devices themselves.	Power supplies must be ordered separately. A combination of two power supplies either J8712A or J8713A is required to power the J8698A chassis. Heat dissipation does not include heat dissipated by the PoE powered devices themselves.	Heat dissipation does not include heat dissipated by the PoE powered devices themselves.
Safety			
	CSA 22.2 No. 60950; UL 60950; IEC 60950; EN 60950	CSA 22.2 No. 60950; UL 60950; IEC 60950; EN 60950	CSA 22.2 No. 60950; UL 60950; IEC 60950; EN 60950
Emissions			
	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A
Immunity			
EN	EN 55024, CISPR 24	EN 55024, CISPR 24	EN 55024, CISPR 24
ESD	IEC 61000-4-2; 4 kV CD, 8 kV AD	IEC 61000-4-2; 4 kV CD, 8 kV AD	IEC 61000-4-2; 4 kV CD, 8 kV AD
Radiated	IEC 61000-4-3; 3 V/m	IEC 61000-4-3; 3 V/m	IEC 61000-4-3; 3 V/m
EFT/Burst	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)
Surge	IEC 61000-4-5; 1 kV/2 kV AC	IEC 61000-4-5; 1 kV/2 kV AC	IEC 61000-4-5; 1 kV/2 kV AC
Conducted	IEC 61000-4-6; 3 V	IEC 61000-4-6; 3 V	IEC 61000-4-6; 3 V
Power frequency magnetic field	IEC 61000-4-8; 1 A/m, 50 or 60 Hz	IEC 61000-4-8; 1 A/m, 50 or 60 Hz	IEC 61000-4-8; 1 A/m, 50 or 60 Hz
Voltage dips and interruptions	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods
Harmonics	EN 61000-3-2, IEC 61000-3-2	EN 61000-3-2, IEC 61000-3-2	EN 61000-3-2, IEC 61000-3-2
Flicker	EN 61000-3-3, IEC 61000-3-3	EN 61000-3-3, IEC 61000-3-3	EN 61000-3-3, IEC 61000-3-3
Management			

	HP ProCurve Manager Plus; HP ProCurve Manager (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)	HP ProCurve Manager Plus; HP ProCurve Manager (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)	HP ProCurve Manager Plus; HP ProCurve Manager (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)
Notes			
	When using mini-GBICs with this product, mini-GBICs with revision "B" or later (product number ends with the letter "B" or later, e.g., J4858B, J4859C) are required.	When using mini-GBICs with this product, mini-GBICs with revision "B" or later (product number ends with the letter "B" or later, e.g., J4858B, J4859C) are required.	When using mini-GBICs with this product, mini-GBICs with revision "B" or later (product number ends with the letter "B" or later, e.g., J4858B, J4859C) are required.
Services			
	3-year, 4-hour onsite, 13x5 coverage for hardware (UE250E) 3-year, 4-hour onsite, 24x7 coverage for hardware (UE251E) 3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (UE252E) 3-year, 24x7 SW phone support, software updates (UF786E) Installation with minimum configuration, system-based pricing (U4828E) Installation with HP-provided configuration, system-based pricing (U4832E)	3-year, 4-hour onsite, 13x5 coverage for hardware (UE253E) 3-year, 4-hour onsite, 24x7 coverage for hardware (UE254E) 3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (UE255E) 3-year, 24x7 SW phone support, software updates (UF788E) Installation with minimum configuration, system-based pricing (U4828E) Installation with HP-provided configuration, system-based pricing (U4832E)	3-year, 4-hour onsite, 13x5 coverage for hardware (UE253E) 3-year, 4-hour onsite, 24x7 coverage for hardware (UE254E) 3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (UE255E) 3-year, 24x7 SW phone support, software updates (UF788E) Installation with minimum configuration, system-based pricing (U4828E) Installation with HP-provided configuration, system-based pricing (U4832E)
	Refer to the HP Web site at www.procurve.com/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.	Refer to the HP Web site at www.procurve.com/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.	Refer to the HP Web site at www.procurve.com/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.

HP ProCurve Switch 5400zl/3500yl Series

Standards and protocols

Device management
RFC 1591 DNS (client)
HTML and telnet management

General protocols
IEEE 802.1ad Q-in-Q (Premium License)
IEEE 802.1D MAC Bridges
IEEE 802.1p Priority
IEEE 802.1Q VLANs
IEEE 802.1s Multiple Spanning Trees
IEEE 802.1v VLAN classification by Protocol and Port
IEEE 802.1w Rapid Reconfiguration of Spanning Tree
IEEE 802.3ad Link Aggregation Control Protocol (LACP)
IEEE 802.3af Power over Ethernet
IEEE 802.3x Flow Control
RFC 768 UDP
RFC 783 TFTP Protocol (revision 2)
RFC 792 ICMP
RFC 793 TCP
UDLD (Uni-directional Link Detection)
RFC 826 ARP
RFC 854 TELNET
RFC 868 Time Protocol
RFC 951 BOOTP
RFC 1058 RIPv1
RFC 1350 TFTP Protocol (revision 2)
RFC 1519 CIDR
RFC 1542 BOOTP Extensions
RFC 2030 Simple Network Time Protocol (SNTP) v4
RFC 2131 DHCP
RFC 2453 RIPv2
RFC 2548 (MS-RAS-Vendor only)
RFC 3046 DHCP Relay Agent Information Option
RFC 3576 Ext to RADIUS (CoA only)
RFC 3768 VRRP (Premium License)
RFC 4675 RADIUS VLAN & Priority

IP multicast
RFC 2362 PIM Sparse Mode (Premium License)
RFC 3376 IGMPv3 (host joins only)
RFC 3973 PIM Dense Mode (Premium License)

IPv6
RFC 1981 IPv6 Path MTU Discovery
RFC 2460 IPv6 Specification
RFC 2710 Multicast Listener Discovery (MLD) for IPv6
RFC 2925 Remote Operations MIB (Ping only)
RFC 3019 MLDv1 MIB
RFC 3315 DHCPv6 (client only)
RFC 3513 IPv6 Addressing Architecture
RFC 3596 DNS Extension for IPv6
RFC 3810 MLDv2 (host joins only)
RFC 4022 MIB for TCP
RFC 4113 MIB for UDP
RFC 4251 SSHv6 Architecture
RFC 4252 SSHv6 Authentication
RFC 4253 SSHv6 Transport Layer
RFC 4254 SSHv6 Connection
RFC 4293 MIB for IP
RFC 4419 Key Exchange for SSH
RFC 4443 ICMPv6
RFC 4541 IGMP & MLD Snooping Switch
RFC 4861 IPv6 Neighbor Discovery
RFC 4862 IPv6 Stateless Address Auto-configuration

MIBs
RFC 1213 MIB II
RFC 1493 Bridge MIB
RFC 1724 RIPv2 MIB
RFC 1850 OSPFv2 MIB
RFC 2021 RMONv2 MIB
RFC 2096 IP Forwarding Table MIB
RFC 2613 SMON MIB
RFC 2618 RADIUS Client MIB
RFC 2620 RADIUS Accounting MIB
RFC 2665 Ethernet-Like-MIB
RFC 2668 802.3 MAU MIB
RFC 2674 802.1p and IEEE 802.1Q Bridge MIB
RFC 2737 Entity MIB (Version 2)
RFC 2787 VRRP MIB
RFC 2863 The Interfaces Group MIB
RFC 2925 Ping MIB

Network management
IEEE 802.1AB Link Layer Discovery Protocol (LLDP)
RFC 2819 Four groups of RMON: 1 (statistics), 2 (history), 3 (alarm) and 9 (events)
RFC 3176 sFlow
ANSI/TIA-1057 LLDP Media Endpoint Discovery (LLDP-MED)
SNMPv1/v2c/v3
XRMON

OSPF
RFC 2328 OSPFv2 (Premium License)
RFC 3101 OSPF NSSA

QoS/Cos
RFC 2474 DiffServ Precedence, including 8 queues/port
RFC 2597 DiffServ Assured Forwarding (AF)
RFC 2598 DiffServ Expedited Forwarding (EF)

Security
IEEE 802.1X Port Based Network Access Control
RFC 1492 TACACS+
RFC 2865 RADIUS (client only)
RFC 2866 RADIUS Accounting
Secure Sockets Layer (SSL)
SSHv1/SSHv2 Secure Shell

HP ProCurve Switch 5400zl/3500yl Series accessories

Premium License for Switch 3500 Series (J8993A)

Premium License for Switch 5400 Series (J8994A)

HP ProCurve Switch zl 1500 W Power Supply (J8713A)

HP ProCurve Switch zl 875 W Power Supply (J8712A)

HP ProCurve 620 Redundant/External Power Supply (J8696A)

HP ProCurve Switch zl Power Supply Shelf (J8714A)

HP ProCurve 100-FX SFP-LC Transceiver (J9054B)

NEW HP ProCurve 100-BX-D SFP-LC Transceiver (J9099B)

NEW HP ProCurve 100-BX-U SFP-LC Transceiver (J9100B)

HP ProCurve Gigabit-SX-LC Mini-GBIC (J4858C)

HP ProCurve Gigabit-LX-LC Mini-GBIC (J4859C)

HP ProCurve Gigabit-LH-LC Mini-GBIC (J4860C)

HP ProCurve Gigabit 1000Base-T Mini-GBIC (J8177C)

NEW HP ProCurve 1000-BX-D SFP-LC Mini-GBIC (J9142B)

NEW HP ProCurve 1000-BX-U SFP-LC Mini-GBIC (J9143B)

HP ProCurve 10-GbE X2-SC SR Optic (J8436A)

NEW HP ProCurve 10-GbE X2-SC LRM Optic (J9144A)

HP ProCurve 10-GbE X2-SC LR Optic (J8437A)

HP ProCurve 10-GbE X2-SC ER Optic (J8438A)

HP ProCurve 10-GbE X2-CX4 Transceiver (J8440B)

HP ProCurve 10-GbE CX4 Media Converter (J8439A)

Wireless Access Controllers

HP ProCurve Wireless Edge Services zl Module (J9051A)

HP ProCurve Redundant Wireless Services zl Module (J9052A)

yl Modules

HP ProCurve Switch yl 10-GbE 2-Port CX4 + 2-Port X2 Module (J8694A)

zl Modules

HP ProCurve Switch zl 4-Port 10-GbE X2 Module (J8707A)

HP ProCurve Switch zl 24-Port 10/100/1000 PoE Module (J8702A)

HP ProCurve Switch zl 20-Port 10/100/1000 + 4-Port Mini-GBIC Module (J8705A)

HP ProCurve Switch zl 4-Port 10-GbE CX4 Module (J8708A)

HP ProCurve Switch zl 24-Port Mini-GBIC Module (J8706A)

HP ProCurve Switch 5406zl Intelligent Edge (J8697A)

NEW HP ProCurve ONE Services zl Module (J9289A)

HP ProCurve Switch 5406zl-48G Intelligent Edge (J8699A)

NEW HP ProCurve ONE Services zl Module (J9289A)

HP ProCurve Switch 5400zl/3500yl Series

HP ProCurve Switch 5412zl Intelligent Edge (J8698A)

NEW HP ProCurve ONE Services zl Module (J9289A)

HP ProCurve Switch 5412zl-96G Intelligent Edge (J8700A)

NEW HP ProCurve ONE Services zl Module (J9289A)

For more information

To learn more about HP ProCurve Networking, please visit ProCurve.com

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